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A study determined the effect of school organization on pupil attitudes, achievement, conceptual maturity, and classroom behavior. Ten teachers in each of three groups in a midwestern school district were selected and 707 pupils enrolled in their classes comprised the sample. An experimental group was placed in a nongraded form of organization, while control groups retained the traditional form of organization. The pupils in all groups were subdivided into three age groups Normal age, underage, and overage. The results of tests administered to the students suggested the following conclusions: (1) The nongraded form of organization encouraged pupil development in conceptual maturity and participation in group activities, (2) teachers in the nongraded school were more tolerant of "disorderly pupil behavior" than were teachers in the graded schools, (3) the graded form of organization encouraged pupil development in achievement, attitude toward school, and contributing activities during usual teaching episodes, (4) the differences among the age groups were generally as expected, and (5) the behavior of the pupils identified as underage, normal age, and overage supported the multiage nongraded plan of organization. (HW)

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PUPIL ATTITUDES, ACHIEVEMENT AND BEHAVIOR IN A MULTI-AGE NONGRADED SCHOOL

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Final Report

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Pupil Attitudes, Achievement and Behavior in a Multi-age Nongraded School

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To the staff of Central School, who not only are outstanding teachers but also wonderful people, this study is dedicated.

Grateful recognition is made of the cooperation of the other teachers and administrators in the Evanston Public Schools who were involved in this study, particularly Dr. O. M. Chute, former superintendent of schools, for his support and encouragement at crucial times.

F.X.V.

N.D.B.

SUMMARY

This study sought to determine the effect of the form of school organization on pupil attitudes, achievement, conceptual maturity, and classroom behavior. Ten teachers in each of three groups in Evanston, Illinois, School District #65, were selected and 707 pupils enrolled in their classes comprised the sample. The experimental group was placed in a nongraded form of organization. The control groups, selected by a random process, represented the traditional (graded) form of organization. The pupils in all groups were subdivided into three age groups: normal age, underage, and overage.

Data were collected from the pupils in the fall, winter, and spring of one school year. The specific measures included the *Describe-Your-School*, *Stanford Achievement Tests*, the *Draw-A-Person*, the *Russell Sage Social Relations Test*, and two scales derived from the *Observation Schedule and Record (2 e)*. The scores obtained in the fall on the *Describe Your School*, *Stanford Achievement Test*, and the *Draw-A-Person* were used as covariates; data collected subsequently were the dependent variables.

For the study of 707 pupils in the three school groups, multivariate analyses of covariance were completed to determine the interaction of the age groups and school groups, the differences among the age groups, and the differences among the school groups.

Significant differences (P $<$.01) were found for the interaction, among the age groups, and among the school groups. The data

indicated that the two classroom observation scales were the only measures to contribute to the interaction. When a multivariate analysis was performed that eliminated these two measures, significant differences were obtained only for the age groups and school groups ($P < .01$).

Univariate analyses performed to indicate directionality of the differences among the age groups revealed that the underage pupils had the highest scores and the overage pupils the lowest scores ($P < .01$) on the measures of achievement, group planning, and conceptual maturity. For the scale of group operations-contributing, the overage pupils were the highest and the normal age the lowest ($.01 < P < .05$). For the observation, contributing, the normal age pupils scores the highest ($P < .01$). For all other measures, no differences were found that were statistically significant.

The univariate analyses utilizing measures on the school groups showed higher scores for the experimental group ($P < .01$) on measures of conceptual maturity, group planning, and observations-non-contributing. Control group one had higher scores on measures of achievement ($P < .01$), attitudes ($P < .01$), and observations-contributing ($.01 < P < .05$). Control group two had the highest scores on the operations, contributing ($P < .01$). There were no differences among the groups on the measure of group operations-non-contributing that were statistically significant.

For the study of 224 pupils in a nongraded school, a multivariate analysis of covariance was completed to determine differences among the age groups.

Significant differences ($.01 < P < .05$) were found among the age groups.

Univariate analyses performed to indicate directionality of the differences among the age groups revealed that the underage pupils had the highest scores and the overage the lowest scores in the area of achievement and group operations, contributing scale ($.01 < P < .05$).

CHAPTER I

INTRODUCTION

Much of current educational theory would indicate that solutions to the age old problems of the elementary school of grouping and promotion, individualization of instruction, and improvement of teaching could come through adaptation and change of a traditional school to a nongraded organization.[1] Such a change requires effort on the part of many people: adaptability of methods and acquisition of special skills by teachers; encouragement and direct participation by administrative staff; and positive responses and demonstrations of learning from pupils. Is such an attempt worth the effort?

Advocates of this plan of organization say that it is.[2] Evidense exists that many educators believe these claims.[3] Evidence is also available that increasing numbers of school systems are instituting nongraded programs.[4]

The current increase in the number of nongraded schools is actually a resurgence of an organizational scheme used in the first American Schools. The Dame Schools of the seventeenth century and the district schools of the eighteenth century were nongraded.[5] The widespread use of this type of organization continued until the Quincy Grammar School was organized on a graded basis.[6] For the next several years the development of the graded system was rapid and extensive.[7] A variety of attempts were made to modify the graded schools and make more provisions for individual differences. Eventually the nongraded organizational scheme was revived and used in schools larger than the one-room variety. Since the organization of the first modern nongraded school in Western Springs, Illinois, in 1934,[8] the number of school systems using this form of organization has continued to increase.[9]

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[1] John I. Goodlad and Robert H. Anderson, The Nongraded Elementary School (revised edition) (New York: Harcourt, Brace and World, Inc., 1933), pp. 52-59; B. Frank Brown, The Nongraded High School (New York: Prentice Hall, 1955), pp. 67-80.

[2] Goodlad and Anderson, op. cit., pp. 53-59; Brown, op. cit., pp. 67-80.

[3] National Education Association Research Division, "Nongraded Schools," NEA Research Memo, 1965-13, May, 1965, p. 2.

[4] Ibid., p. 2.

The nongraded school is characterized by a philosophy based on a belief in the individual and unique nature of each child. It is organized and operated to maximize the opportunities for individualization of instruction and learning for every child. A nongraded school's course of study is organized into sequential units of work but without the usual time restrictions of a graded school's course of study. A pupil is permitted to proceed through the course of study at his own unique rate, independently of the calendar.[10]

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[5] John I. Goodlad, "Classroom Organization," Encyclopedia of Educational Research (third edition, Chester Harris, ed.; New York: MacMillan Company, 1930), p. 222.

[6] *Ibid.*, p.222.

[7] *Ibid.*

[8] *Ibid.*

National Education Association Research Division, *op. cit.*, p. 2.

A nongraded program should provide an opportunity for any child in a classroom, regardless of age, to be a member of a group within that room whose members have comparable physical and social development. These characteristics of nongraded classes should encourage the development of positive classroom behaviors of pupils. Unfortunately, research studies related to the effects of a nongraded program on overage and underage pupils are lacking.

I. PURPOSE OF STUDY

This project was designed to study the relationship of different forms of school organization to classroom behaviors of pupils identified as normal age, underage, and overage. More specifically, it was the purpose of this study to explore the questions:

1. Where there are differences in the classroom behaviors of normal age, underage, and overage pupils in nongraded classes

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[10] An integral part of the nongraded organizational scheme is multi-age grouping. Multi-age grouping refers to an educational design in which pupils of two or three age groups are placed together for their instructional program. When used in this way, no pupil in any given age group within a classroom is identified as accelerated or retained. This differs, of course, from graded schools which have multi-age classes because of retention or acceleration of pupils.

Mention is made here of the relationship between nongradedness and multi-age grouping because many schools call themselves "nongraded" but do not utilize multi-age grouping. Such schools are in reality graded schools which have modified the curriculum to individualize instruction.

as compared with normal age, underage and overage pupils in traditional graded classes in one school district?

2. Were there differences in the classroom behaviors of normal age, underage, and overage pupils in the nongraded school?

If the nongraded school, as compared with a traditional graded form of organization, does indeed facilitate the resolution of problems related to pupil achievement in terms of commonly accepted educational objectives, the evidence of any differences would be reflected in pupils' classroom behaviors.

This study, then, sought to show the relationship between the organizational scheme of the school and pupils' classroom behaviors.

II. SIGNIFICANCE OF THE STUDY

The effects on pupils of the nongraded form of school organization is a topic current to educational thinking. One-third of all urban school districts in the United States have reported use of the nongraded plan of organization.[11] Multi-age grouping is an integral part of nongraded programs. This study is among the first to evaluate the effects of multi-age grouping in a nongraded school. Evaluation of the worth of the nongraded school as an effective means of promoting desirable classroom behavior should be valuable to schools concerned with a variety of different kinds of enrollments. Results of the study should also be of value to schools contemplating changes in their plan of organization.

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[11] National Education Association Research Division, op. cit., p.2.

III. DEFINITIONS OF TERMS

For the purpose of this study, the following terms will be defined as indicated.

Nongraded

Nongraded refers to a school program in which the course of study is organized in a continuous manner with no time restrictions for completion of any unit.[12] A child is able to progress from one unit to the next at any time during the school year. In addition, all grade labels are removed from the school and the course of study, and classes are characterized by multi-age groupings.

Ungraded

Ungraded is synonomous with nongraded.

Graded

Graded refers to a school program in which the course of study is organized into units with definite time restrictions for each unit. A child does not normally move into the units of the next grade until he is chronologically the correct age for that grade.[13] A child is also expected to complete a certain portion of the course of study in each academic year.

Acceleration

Acceleration occurs when a child completes a portion of the course of study faster than is usual and is then moved to the next grade

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[12] Goodlad and Anderson, op. cit., p. 58.

[13] Ibid., p. 58.

Retention

Retention occurs when a child does not complete a portion of the grade course of study in the prescribed amount of time. Usually the child is required to repeat a portion of the course of study with a group of children younger than he is.

Operational Definitions

The following definitions have been defined operationally for the purpose of this study. The complete absence of research studies concerned with overage and underage pupils in a nongraded class has resulted in a void of definitions of normal age, underage, and overage as these terms apply to nongraded classes.

Normal age. -- In graded classes, normal age refers to pupils born during the calendar year which is normal for that grade. In nongraded classes, normal age refers to pupils born up to six months before or after the median birthdate of that class.

Underage. -- In graded classes, underage refers to pupils born after the calendar year which is normal for that grade. In nongraded classes, underage refers to pupils born more than six months after the median birthdate of that class.

Overage. -- In graded classes, overage refers to pupils born before the calendar year which is normal for that grade. In nongraded classes, overage refers to pupils born more than six months before the median birthdate of that class.

IV. SUMMARY

It has been suggested that a revival of the nongraded form of school organization might contribute considerably to solutions of the problems of the elementary school of grouping, promotion, individualization of instruction, and improvement of teaching. The inclusion of multi-age grouping as an integral part of school should give additional flexibility to this organizational plan. It was the purpose of this study to evaluate the relationship between the organizational form of school; i.e., nongraded and traditional graded; and the attitudes toward school, academic achievement, and classroom behavior of pupils identified as normal age, underage, and overage. This study should have significance for schools contemplating changes in their own organizational scheme.

Individualization of instruction is becoming increasingly important as more and more schools are faced with the problem of assimilating pupils from different backgrounds into the classroom. The possibilities for maintaining positive attitudes toward school, increasing academic achievement, and improving classroom behavior may be greater in a more flexible structure. It is claimed that the nongraded school provides the flexibility needed. This study proposed to evaluate the relationship between the organizational scheme of the school and the attitudes, achievement, and classroom behavior of pupils.

V. OVERVIEW OF THE STUDY

Chapter II deals with a review of the literature related to nongraded schools. Chapter IXX presents the design of the study and the procedures used in the collection and analysis of data.

Chapter IV contains the results of the study and their interpretations, and Chapter V has the summary, conclusions, and discussion.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter reviews the literature related to three areas: the historical perspective of the nongraded schools reporting quantitative data, and research studies of acceleration and retention.

I. HISTORICAL PERSPECTIVE OF THE NONGRADED SCHOOL

The development of the nongraded school is often considered a fairly recent innovation in education. In reality, however, the first American schools were organized in a nongraded pattern. The Dame Schools of the seventeenth century and the district schools of the eighteenth century were without grade classifications.[1] When the district schools became more permanent, they became the one-room schoolhouse which also was ungraded.[2]

Although these first nongraded schools undoubtedly contributed considerably to the needs of the times, educational programs of that age suffered from many deficiencies. Most of these were unrelated to nongradedness, but the effort to improve the schools resulted in the disappearance of most nongraded schools.

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[1] John I. Goodlad, "Classroom Organization," Encyclopedia of Educational Research (third edition; ed. Chester Harris; New York: MacMillan Company, 1960), p. 222.

[2] Newton Edwards and Herman O. Richey, The Schools in the American Social Order (second edition; Boston: Houghton Mifflin Company), 1963, p. 354.

The movement toward public, state-supported education, the inception of the monitorial system, the development of the normal schools, the appearance of graded textbooks,[3] and the influence of European educational thought[4] combined to bring forth the Quincy Grammar School which is generally recognized as the first graded school.[5] By 1870 the graded plan with graded classes, graded content, graded textbooks, and even graded teachers was firmly established.[6] As stated by one writer, "Education had quickly moved from no system to nothing but system."[7]

Although the graded system gained widespread usage, it soon came under fire from a number of educators who felt the system demanded too much conformity and denied individual differences. Otto[8] lists ten attempts to modify the plan. For example, these attempts included the St. Louis Plan begun in 1857 which placed promotion on a quarterly basis to relieve the problems of retention; the Pueblo Plan which provided for individual programs for each pupil; the Cambridge Plan which probably was the first track system; the Platoon System which utilized departmentalization and ability grouping; and the Winnetka Plan which concentrated on individualization of instruction. All of these plans were attempts to modify, not change, the basic graded system.

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[3] Goodlad and Anderson, op. cit., p. 48.

[4] R. F. Butts and L. A. Cremin, A History of Education in American Culture (New York: Henry Holt and Company, 1966), p. 275.

[5] Edwards and Richey, op. cit., p. 354.

[6] Goodlad and Anderson, op. cit., p. 22.

[7] Henry Otto, "Instructional Organization of Schools," Encyclopedia of Educational Research (second edition; ed. Walter S. Monroe; New York: Macmillan Company, 1950), 371.

[8] Otto, ibid.

The 1930's mark the emergence of a movement designed to change, not modify, the basic system. Although it is difficult to identify the exact beginning of this movement, the development of the nongraded school at Western Springs, Illinois,[9] in 1934 may have been the first of its type. Other early nongraded programs were reported in Richmond, Virginia,[10] and Cleveland, Ohio.[11] However, the Milwaukee Plan, begun in 1942, is generally recognized as being the oldest of the nongraded plans still in existence. At least, it has been reported as the first large system to initiate the plan on a wide scale.[12]

The growth of the movement was very slow. Slater[13] in 1955 identified twenty-eight nongraded centers in operation. Goodlad and Anderson[14] in 1957-58 identified forty-four communities with one or more nongraded schools. The National Education Association Research Division made surveys of urban communities in 1960[15] and 1964[16] and found the percentage of systems with one or more nongraded schools rose from 6.3 to 32.3. In addition, the 1964 survey found that of the systems which had nongraded programs, 12 per cent had them in all of their schools, 21 per cent had them in sixteen or more schools, and 13 per cent had them in six to fifteen schools.[17]

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[9] L. B. Whent, "The Flexible Progress Plan," Elementary School Journal, XXXVIII (November, 1937), 175-183.

[10] National Education Association Research Division, "Nongrading: A Modern Practice in Elementary School Organization," NEA Research Memo, 1931-37, October, 1961, 3.

[11] H. M. Buckley, "Combating the Problem of Failures," Nation's Schools, XXXII (November, 1943), 105.

[12] Goodlad and Anderson, op. cit., p. 53.

[13] E. M. Slater, The Primary Unit, Storrs; Curriculum Bulletin No. 3, School of Education, University of Connecticut, 1955. (Mimeographed.)

Although these surveys indicate a wider adaptation of the nongraded philosophy in recent years, one must recognize the limitations before making general conclusions based on their findings. Questions relative to the meaning of nongradedness as practiced in these systems and what is happining in systems not surveyed must be raised.

In summary, the early American schools were nongraded due to necessity but later were largely replaced due to necessity--the necessity of providing education for increasing numbers of pupils quickly. After the Quincy School started the graded movements, attempts were soon proposed for modifying it. It was not until the 1930's that real attempts were made to change the system. The early attempts at changing the system were not particularly successful, however, and it wasn't until Milwaukee began its program in 1942 that nongraded programs seemed healthy enough to survive the strains of birth and growth. Surveys of the number of nongraded schools, are, at best, an estimate. However, there are indications that the number of nongraded schools is increasing.

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[14] Goodlad and Anderson, op. cit., p. 55.

[15] National Education Association Research Division, op. cit.

[16] National Education Association Research Division, "Nongraded Schools," NEA Research Memo, 1965-12, May, 1965, p. 2.

[17] Ibid., p. 3.

II. RESEARCH STUDIES OF NONGRADED SCHOOLS REPORTING QUANTITATIVE DATA

The dearth of well-designed research studies reporting quantitative data related to the nongraded school has certainly not encouraged its adaptation. A recent review of the literature made by the investigator[18] and an associate revealed only twelve research studies of the nongraded school reporting quantitative data. Of this number, eight reported advantages for pupils in nongraded schools--Backroth,[19] Buffie,[20] Halliwell,[21]

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[18] F. X. Vogel and Mary Jo Weingarten, "A Review of the Literature Related to Nongraded Schools with Special Attention to Studies Reporting Quantitative Data" (unpublished course paper, Northwestern University, Evanston, 1966), (Mimeographed).

[19] Sister M. Bernaedo Backroth, "An Evaluation of the Ungraded Primary as an Organizational Device for Improving Learning in St. Louis Archdiocesean Schools"(unpublished doctoral dissertation, St. Louis University, St. Louis, 1959).

[20] Edward G. W. Buffie, "A Comparison of Mental Health and Academic Achievement: The Nongraded School vs. the Graded School" (unpublished doctoral dissertation, Indiana University, Bloomington, 1962).

[21] J. W. Halliwell, "A Comparison of Pupil Achievement in Graded and Nongraded Primary Classroom," The Journal of Experimental Education, XXXII (Fall, 1963), 59-63.

Hart,[22] Hickey,[23] Hillson,[24] Ingram,[25], and Skapski.[26] Four reported advantages for pupils in graded programs--Carbone,[27] Enevoldsen,[28] Hopkins,[29] and Moore.[30]

Backroth[31] evaluated the ungraded primary program in the St. Louis Archdiocesean Schools by comparing reading scores of fourth grade pupils in 1953 with the reading scores of pupils who had finished the ungraded primary in 1956. The reading scores were significantly higher, at the .01 level, in 1956 than they were in 1953. The study, however, seemed to be quite limited in scope and left many important variables untested. No data were presented relative to the experience and training of the teachers involved, nor to the amount of in-service education and curriculum revision in which the ungraded schools may have engaged. The question of the comparability of schools and pupils over a period of time also was left unanswered. One can only conclude that with so many unknown variables, the results may or may not have been due to the ungraded primary.

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[22] Richard M. Hart, "The Non-Graded Primary School and Arithmetic," Arithmetic Teacher, IX (March, 1962), 130-131.

[23] Sister M. P. Hickey, "An Analysis and Evaluation of the Ungraded Primary Program of Pittsburgh" (unpublished doctoral dissertation, Fordham University, New York, 1962).

[24] Maurie Hillson, et.al., "A Controlled Experiment Evaluating the Results of a Nongraded Organization on Pupil Achievement," Journal of Educational Research, LVII (July-August, 1964), 548-550.

[25] Vivian Ingram, "Flint Evaluates Its Primary Cycle," Elementary School Journal, LXI (November, 1960), 76-80.

[26] Mary King Skapski, "Ungraded Primary Reading Program: An Objective Evaluation," Elementary School Journal, LXI (October, 1960), 41-45.

[27] Robert F. Carbone, "Achievement, Mental Health and Instruction in Graded and Nongraded Elementary Schools" (unpublished doctoral dissertation, University of Chicago, Chicago, 1961).

[28] Corwin L. Enevoldsen, "An Evaluation of the Ungraded Primary Program in Selected Schools in the Lincoln, Nebraska, Public School System" (unpublished doctoral dissertation, University of Nebraska Teachers College, Lincoln, Nebraska, 1961).

[29] Kenneth D. Hopkins, et al., "An Empirical Comparison of Pupil Achievement and Other Variables in Graded and Ungraded Classes," American Educational Research Journal, II (November, 1965) 207-215.

[30] D. I. Moore, "Pupil Achievement and Grouping Practices in Graded and Ungraded Primary Schools" (unpublished doctoral dissertation, University of Michigan, Ann Arbor, 1963).

[31] Backroth, op. cit.

Buffie[32] studied the mental health and academic achievement of 234 randomly selected pupils who were in the third grade or the last year of the ungraded primary enrolled in four schools in each of two communities. The communities were in the same geographic area and had comparable levels of support of public education. The schools were matched on the basis of socio-economic level, school enrollment, class size, and the experience and training of teachers. Pupils were matched on the basis of sex, chronological age, and I.Q.

The nongraded pupils earned higher scores, significant at the .05 level, on social adjustment, total adjustment, general language, work-study skills, and academic composite. The nongraded pupils also scored significantly higher when studied by socio-economic level, sex, and I.Q. levels. In addition, there was a trend favoring the nongraded pupils on every section of the personality test and on the reading, general vocabulary development, and arithmetic sections of the achievement test.

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[32] Buffie, op. cit.

These results seem rather impressive at first glance. However, there may have been significant differences between the two communities; for instance, the curriculum content may have been quite different, the amount and variety of curriculum building engaged in was not reported, and the pupils were not matched when they entered the programs. It seems unfortunate that a study which came so close to making a truly significant contribution to the literature had to fall short. As a result, the generalizability of the study is seriously handicapped.

Carbone[33] assessed the difference in achievement, mental health, and instructional practices in a study of 122 matched graded and ungraded pupils. The schools selected were of comparable size. The graded pupils scored significantly higher, at the .01 level, in achievement and on social participation. The nongraded pupils scored higher, at the .05 level, on the _Semantic Differential_, which is a measure of pupils' feelings about their teachers.

Questions the investigator left unanswered included whether the nongraded schools were truly nongraded, whether the communities were comparable, whether the pupils were matched when entering school, and whether one can in fact validly evaluate a primary program after one, two, or even three years had elapsed since the pupils were in the primary program.

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[33] Carbone, _op. cit._

Unfortunately, one has the feeling that a seemingly good study was seriously limited by the restrictions under which most graduate students operate.

Enevoldsen[34] studied the achievement of 430 pupils who had completed three years of school in graded and ungraded classrooms. The investigator further identified the top and bottom thirty-five pupils and studied them. The total graded group scored significantly higher, at the .05 level, on arithmetic reasoning. The low graded pupils scored higher, significant at the .05 level in reading vocabulary, arithmetic reasoning, total arithmetic, and total battery than the matched nongraded pupils.

Study of the research technique revealed no randomization of samples, no matching of teachers, no matching of pupils when they entered school, and the low graded group did not include twenty-four retained pupils whereas the low ungraded group included all but nine pupils.

Again, the limitations of the study limits the generalizability of it.

Halliwell[35] compared the achievement of 146 pupils in a nongraded program with 149 pupils who had attended the same school the previous year when it was a graded school. The nongraded pupils scored higher, significant at the .05 level, in all academic areas tested.

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[34] Enevoldsen, op. cit.

[35] Halliwell, op. cit., 59-63.

Probably the most important question in this study involves the amount of time and nature of curriculum development and planning in which the teachers engaged as the nongraded program was developed. It seems likely that if the staff was engaged in such activities, it would be impossible to determine which of the changes to attribute to the nongraded program and which to attribute to the curriculum activity. In addition, no evidence was presented to indicate if the pupils were matched when they entered the program.

One would have to applaud the undertaking of a research project by public school personnel, but unfortunately the untested variable limit the conclusions one can draw from the study.

Hart,[36] in a similar experiment, studied the arithmetic achievement of pupils who had spent three years in graded and ungraded schools. The pupils were matched in I.Q., chronological age, and socio-economic status. Similarities in instructional methods and materials used, teaching time, and emphasis given arithmetic instruction and class load were reported. However, the nongraded teachers had developed a systematic arithmetic program as well as materials of instruction. As might be expected, the nongraded pupils scored higher in arithmetic achievement, significant at the .02 level.

The author himself lists the major limitation of the study in terms of generalizability when the curriculum work of the nongraded teachers is identified. In addition, this study seems particularly susceptible to the Hawthorne effect. Finally, no evidence was presented to indicate if the groups were matched when they entered school. A replication of the study with more of the variables controlled would be interesting.

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[36] Hart, op. cit.

Hickey,[37] in a study dealing with achievement, personal and social adjustment, and teacher opinion found significant achievement advantages for all groups of the ungraded pupils except for the low I.Q. girls in arithmetic problems and computation. In addition, the ungraded girls scored significantly higher than the graded girls on social adjustment. Teachers who had worked in both types of organizational pattern preferred the ungraded program.

The investigator did not present evidence to indicate if the groups were matched before they entered school, if the teachers were matched, or if the level of curriculum activity was comparable in the two groups. With unanswered questions relating to such important variables, one can only use great caution in generalizing from the results.

Hillson and associates[38] attempted to control more of the variables in an experiment in which fifty-two pupils were assigned at random to a graded or nongraded class. Pupils in the graded class could not proceed beyond the first grade material while there was no ceiling for the nongraded pupils.

As might be expected, the nongraded pupils scored higher, significant at the .01 level, in reading and word meaning.

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[37] Hickey, op. cit.

[38] Hillson, et al., op cit., 548-550.

No data were presented to show that the pupils were matched at the beginning of the study. Teachers were matched and all teachers engaged in comparable curriculum development and in-service activities.

Although this study did in fact control more of the variables, the arbitrary ceiling in the graded group would make one expect a higher level of achievement for some of the nongraded pupils. To the extent that graded programs do impose ceilings, this study would be valid. However, there are probably many graded schools which have removed the usual grade ceiling. In addition, many proponents of the nongraded plan would feel that to nongrade a shool requires more than just removing the grade level ceilings.

While the authors did succeed in controlling most of the variables in the study, the narrow scope of it prohibits its being a major contribution to literature.

Hopkins, et al.,[39] studied the reading achievement of pupils in graded and ungraded classrooms. The groups were equated on intelligence and the training of teachers. The graded girls scored higher, significant at the .01 level, in vocabulary comprehension and total score.

This study applied the most sophisticated statistics of any study reviewed to obtain the maximum information relative to the interaction effects of the variables. However, no evidence was provided to indicate whether the ungraded programs were in fact ungraded and few proponents of nongradedness would suggest that the advantages of the plan are restricted to achievement.

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[39] Hopkins, et al., op. cit., 207-315.

Inasmuch as this seemed to be a well-designed study, it is unfortunate that attention was not directed to attitudes, mental health, or other areas of the affective domain.

Ingram[40] made a two-way study of the academic achievement of pupils who had completed a three year non-graded primary cycle in 1959. These pupils were compared with pupils in the same school who had completed the cycle in 1956 when the school was graded. The nongraded pupils were also compared with all of the other pupils in the school district who completed third grade in 1959. The nongraded pupils scored higher, significant at the .01 level, in paragraph meaning, word meaning, spelling, and language than either of the other groups.

Several weaknesses are readily apparent in this study. The author presents evidence relative to the intellectual or socio-economic levels of the three groups nor any information concerning teacher training, experience, or involvement in curriculum activities. It seems unfortunate that additional information was not presented which would have made the results much more valid.

Moore[41] investigated the differences in reading and arithmetic achievement between pupils in an ungraded primary organization and pupils in a traditional graded school. In addition, the instructional practices of the teachers in the two groups were compared.

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[40] Ingram, op. cit., 70-80.

[41] Moore, op. cit.

Limitations of the study as stated by the investigator included the facts that the pupils were not randomly selected, the teachers were not matched, there were several personnel changes during the year including the reassignment of one principal, the pupils were in the ungraded program for only one year, and the ungraded teachers had not had an opportunity to develop an understanding of the concepts and methods of an ungraded plan. In addition, this was the first year of the ungraded program.

The graded pupils scored higher, significant at the .05 level, in all academic areas.

One can easily conclude after reading the limitations of the study as reported by the author that that particular ungraded program was not ready to be evaluated. In fact, one might speculate that the ungraded school was ungraded in name only.

Skapski[42] compared the reading achievement with arithmetic achievement of pupils in an ungraded reading program but a graded arithmetic program. These pupils, hereafter called the ungraded pupils, were also compared with pupils in two graded schools. There were no significant differences between intelligence levels, socio-economic status, or teacher experience of the two groups.

The "ungraded" pupils scored significantly higher in reading than in arithmetic. These pupils also scored higher, significant at the .01 level, than did the graded pupils. Spelling and arithmetic achievement of the "ungraded" pupils were also higher than the graded pupils.

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[42] Skapski, op. cit., 41-45.

The fact that the "ungraded" pupils scored higher than the other pupils in areas in which the "ungraded" pupils' instruction was in a graded program would lead one to suspect that factors other than ungradedness were the cause of the differences in reading and arithmetic achievement of pupils in many kinds of programs due to a variety of reasons unrelated to the kind of school organization being used.

In summary, one must applaud the efforts to do research in an area in which so many variables are important. Unfortunately, few researchers were able to control enough of the variables so as to permit much generalizability from their studies. In addition, none of the studies dealt with the effects of a nongraded program on overage and underage pupils.

III. RESEARCH STUDIES OF ACCELERATION AND RETENTION

Considerable research has been done with accelerated and retained pupils. Perhaps the best known studies of acceleration and giftedness have been done by Terman. He reports, "it is our opinion that children of 135 I.Q. or higher should be promoted sufficiently to permit college entrance by the age of seventeen at the latest, and that a majority in this group would be better off to enter at sixteen."[43] Pressey has said, "At long last, it is becoming generally admitted that some acceleration of some gifted youngsters is desirable."[44] He went on to quote from a conference of representatives of the American Psychological Association, the American Educational Research Association, and the Association for Supervision and Curriculum Development that, "The research testimony as to the advantages of acceleration is weighty, consistent and continuous over several decades. [However, acceleration was judged not] the best method for dealing with the able. It is probable that acceleration should not take place with youngsters whose I.Q. is below 130."[45]

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[43] Lewis M. Terman and Melita H. Oden, The Gifted Child Grows Up (Stanford: Stanford University Press, 1947), p. 281.

Shannon,[46] in a review of literature, reports that the research supports acceleration. Thompson and Meyer report, " The research evidence indicated in all of the studies reviewed that there are no adverse effects from acceleration. . . .The overwhelming evidence still remains in favor of acceleration with positive effects."[47]

Numberous other studies could also be cited, but the general conclusion seems to be that acceleration of gifted children is desirable. However, all of the studies reported dealt only with pupils in graded schools.

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[44] Sidney L. Pressey, "Educational Acceleration: Occasional Procedure or Major Issue?," Personnel and Guidance Journal, XLI (September, 1962), 12-17.

[45] Ibid.

[46] D. C. Shannon, "What Research Says About Acceleration," Phi Delta Kappan, XXXIX (September, 1957), 70-72.

[47] Jack Thompson and Lesley H. Meyer, "What Research Says About Acceleration," Journal of Secondary Education, XXXVI (May, 1961), 301-305.

The case for retention or nonpromotion, while not clear-cut, seems to be much less favorable. Coffield and Blommers[48] found that during the year following failure, the nonpromoted pupils typically progressed about four to six months less than matched promoted pupils, and that the educational progress of the nonpromoted during the two years following the failure was not significantly different from the matched promoted pupils' progress during one year. Kamii and Weidart[49] found that pupils retained once received significantly lower grades than promoted pupils and that more than 50 per cent of retained pupils had at least average intelligence. Lobdell[50] found that 71 per cent of nonpromoted pupils continued to make fair or poor academic progress after being retained. Goodlad[51] found undesirable characteristics in both retained and matched promoted pupils. Cook and Clymer report that, "The available evidence indicates that, on the average, they [slow learners] achieve as much or more by being given more regular promotion."[52] Otto, summarizing the findings related to nonpromotion says:

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[48] William H. Coffield and Paul Bommers, "Effects of Non-Promotion on Educational Achievement in the Elementary School," Journal of Educational Psychology, XLVII (April, 1956), 235-250.

[49] Constance K. Kamii and David Weidart, "Marks, Achievement and Intelligence of Seventh Graders Who Were Retained (Nonpromoted) Once in Elementary School," Journal of Educational Research, LVI (May, 1933), 452-459.

[50] L. O. Lobdell, "Results of a Nonpromotion Policy in One School District," Elementary School Journal, LIV (November, 1954), 333.

[51] John I. Goodlad, "Some Effects of Promotion and Non-promotion Upon the Social and Personal Adjustment of Children," Journal of Experimental Education, XXIX (June, 1954), 29-30.

> Repetition of grades has no special educational value for children; in fact, the educational gain of the majority of nonpromoted students subsequent to their nonpromotion is smaller than that of their matched agemates who were promoted. Similarly, the threat of failure has no appreciable positive effect on the educational gain of those threatened. The personal and social adjustment of regularly promoted students is better than that of students who have experienced nonpromotion, and the average level of student achievement tends to be higher in school systems with high promotion rates. A high rate of nonpromotion does not decrease the variability of student achievement, and thus does not free the teacher from the important task of adapting instruction in individual differences. [53]

IV. SUMMARY

The nongraded concept is not new to American education. In fact, most of the schools in this country during the seventeenth and eighteenth centuries were nongraded. However, the pressure from several movements caused the development of the Quincy School. The appeal of the graded system was widespread and the last century has seen mostly graded schools. Various educators attempted to modify the graded system soon after its birth, but they met with only limited success. Finally in the 1930's attempts were made to change the system with the development of the nongraded school. This movement began slowly. However, indications are that the number of nongraded schools has continued to increase, particularly in the last decade.

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[52] Walter W. Cook and Theodore Clymer, "Acceleration and Retardation," Individualizing Instruction (61st Yearbook, National Society for the Study of Education, Part I, ed. Nelson B. Henry. Chicago: University of Chicago Press, 1962), 170-180.

[53] Henry J. Otto, "Grading and Promotion Policies," NEA Journal, XL (February, 1961), 123.

Research studies of the nongraded school have been so few in number and so limited in scope as to warrant caution in drawing general conclusions from them.

The questions of acceleration and retention have been debated and studied for a number of years. The evidence supporting acceleration is rather conclusive. The evidence concerning retention is not so clear-cut, but most studies have shown the results of retention to be undesirable.

Finally, none of the studies have dealt with the effects of a nongraded program on overage and underage pupils. The nongraded studies did not collect data on these types of pupils and studies of acceleration and retention were all done in graded schools.

CHAPTER III

DESIGN AND PROCEDURES

The purposes of this chapter are: (1) to describe the general design utilized in the study; (2) to state the problem and the hypotheses that were tested; (3) to indicate the data that were collected; (4) to describe the samples that were involved; and (5) to list the procedures that were used in the collection and analyses of data.

I. DESIGN OF THE STUDY

In this study, data were collected from defined samples of teachers and their pupils at the beginning and end of a period of time, and then changes in pupil behaviors were analyzed as the criteria for evaluating the effectiveness of the experimental variable.

The general experimental variable under study was the nongraded form of school organization as it related to classroom behavior of pupils.

In addition, to assess the effect of the form of school organization upon pupils whose ages deviated from the usual age expected in a class, the pupils were classified as normal age, underage, or overage. This permitted studying differences between each age group of pupils in the nongraded school and the comparable age group of pupils in the graded school.

II. THE PROBLEM

The questions investigated in this study were:

> Were there differences in the classroom behaviors of normal age, underage, and overage pupils in nongraded classes as compared with normal age, underage, and overage pupils in traditional graded classes?

III. HYPOTHESES TO BE TESTED

To answer this question, the following null hypothesis was defined as the general guide for study:[1]

> There were no differences in the attitudes, academic achievement, conceptual maturity, behavior in a group situation, and classroom behavior among normal age, underage, and overage pupils in nongraded classes and normal age, underage, and overage pupils in traditional graded classes.

IV. THE DATA COLLECTED

Introduction.

To collect data that would supply information regarding this hypothesis, a specified sample of classes was administered a series of standardized tests, inventories, and problems. All participating classrooms were observed by means of a standardized observation schedule. Data were collected during one school year. Data collected at the beginning of the school year included standardized measures of attitudes toward school, academic achievement, and conceptual maturity. Data collected at the end of the school year included standardized measures of attitudes toward school, academic achievement, conceptual maturity, and performance during a standardized group test. During the school year, observations of pupil and teacher classroom behavior during actual teaching episodes were recorded. The specific instruments are summarized in Table 1.

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[1] Specific statistical hypotheses were tested relating to each variable for the age groups and the school groups. These are listed in Table 24, Appendix D. The 5 per cent level of confidence was used for rejecting the hypotheses; if the 1 per cent level of confidence was met, such was reported.

TABLE I

INSTRUMENTS UTILIZED IN THE COLLECTION OF DATA FROM PUPILS

A. Data Collected From Pupils

Achievement Measure
  Stanford Achievement Test (Fall, 1964; Spring, 1965)

Attitude Measure
  Describe Your School (Fall, 1964; Spring, 1965)

Conceptual Maturity
  Draw-A-Man (Fall, 1964; Spring, 1965)
  Draw-A-Woman (Fall, 1964; Spring, 1965)

B. Data Collected by Classroom Observation

Observation Schedule and Record (Fall, 1964; Winter and Spring, 1965)

Russell Sage Social Relations Test (Spring, 1965)

Data Collected From Pupils

Data collected from pupils included the Stanford Achievement Test, a measure of pupils' academic achievement; the Describe Your School, a measure of pupils' attitudes toward school; the Draw-A-Person Test, a measure of conceptual maturity, and socio-economic status.

Stanford Achievement Test. -- Stanford Achievement Test is the designation of a series of comprehensive achievement tests developed to measure the knowledges, skills, and understandings which were felt to be the desirable outcomes of the elementary curriculum.[2] The present edition (1964) is the fifth revision of the series begun in 1923.

The primary purpose of achievement tests is to assess the knowledge, understandings, and skills of the examinee at a specific point in time.[3] Survey-type achievement tests are intended to test the full range of a defined subject matter field and have as main emphases: (1) specific learnings are demanded, and (2) questions are used that can be answered by an examinee who is able to learn new material and to understand basic concepts in the field.[4]

For a variety of reasons, the most generally satisfactory tests for measuring achievement in elementary and junior high school are probably several of the well-known batteries, including the Stanford Achievement Test.[5]

Mirian H. Bryan, revising the test in the Sixth Mental Measurement Yearbook,[6] reports that the Stanford Achievement Test battery is the oldest achievement test battery. The reviewer rates the 1964 edition high among the standardized achievement test batteries for elementary school. The reviewer adds that she would not hesitate to recommend its use.

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[2] Truman L. Kelley, et al., Stanford Achievement Test, Test Manual (New York: Harcourt, Brace and World, Inc., 1964), P.1.

[3] Frederick B. Davis, Educational Measurements and Their Interpretation (Balmont, California: Wadsworth Publishing Company, 1964), p. 95.

[4] Ibid.

[5] Ibid.

[6] Mirian H. Bryan, "The Stanford Achievement Test" in Sixth Mental Measurement Yearbook (O. K. Buros, ed. Highland Park, New Jersey: Grython Press, 1965:, pp. 110-124.

Robert E. Stake and J. Thomas Eastings in their review[7] of the test suggest that school people who have supported inovations in curriculum are likely to have reservations about the item content and emphasis on grade equivalent scores. They add, however, "It seems safe to conclude that if local instructors endorse the content coverage, the Stanford Achievement Test will do as effective a job of measuring elementary school achievement as any standardized battery currently available."[8]

The present edition consists of four batteries which were utilized in this study. The primary I Battery was used with pupils from ages 6.6 to 7.6 and included the tests of Word Meaning, Paragraph Meaning, and Vocabulary. The Primary II Battery was used with pupils from 7.7 to 8.9 years of age and included the tests of Word Meaning, Paragraph Meaning, and Word Study Skills. Intermediate I Battery was used with pupils of ages 9.0 to 10.5 and included the tests of Word Meaning, Paragraph Meaning, Spelling, Work Study Skills, Arithmetic Conputation, Arithmetic Concepts, and Arithmetic Applications. Intermediate II Battery was used with pupils 10.6 years of age and older who were in the sample. The tests for this battery included Word Meaning, Paragraph Meaning, Spelling, Language, Arithmetic Computation, Arithmetic Concepts, Arithmetic Applications, and Science. For each child, an an academic achievement composite was formed by averaging the different part scores. The composit scores were then transformed into T scores using the McCall T transformation so that comparisons could be made between the achievement scores of pupils of different ages.[9]

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[7] Robert E. Stake and J. Thomas Hastings, "Stanford Achievement Battery, 1964," Personnel and Guidance Journal, XLXXX (October, 1964), pp. 178-184.

[8] Ibid., p. 184.

The Stanford Achievement Test seems to be oriented to the more traditional curricula. However, it was selected because it seems no more so than the other well-known achievement batteries and, in addition, it is generally accepted as a well-designed test.

Describe Your School.--The DYS was designed to measure attitudes and morale toward elementary school. The inventory consists of fifty direct questions relating to pupil feelings about the school environment. The total score of the inventory is the number of positive responses. Designed by Cyril J. Hoyt for use with younger pupils, it has been shown to have satisfactory reliability and validity characteristics.[10] A copy of this inventory is included in Appendix E.

The DYS was selected because the total score provides a valid and reliable measure of pupils' attitudes toward school. In addition, an item analysis of the inventories provides valuable information concerning specific teacher behaviors as perceived by the pupils.[11]

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[9] Helen M. Walker and Joseph Lev, Elementary Statistical Methods (revised edition; New York: Holt, Rinehart and Winston, 1958), p. 196.

[10] Another Report in preparation, deals specifically with the Describe Your School and its relationship to teacher behavior and pupil social-economic class.

Draw-A-Person.---- The Goodenough-Harris Draw-A-Person Test[12] was developed as a measure of conceptual maturity. The stages of children's drawings are now rather well delineated. The drawings of the human form, particularly that of the male, reveals progress in the child's concepts such that an index can be derived from his inclusion of body detail. This index provides a [illegible] of intellectual maturity that correlates substantially with tests of so-called general intelligence, and relates to the ability to do abstract thinking. It does not correlate more highly with esthetic, motor, perceptual, or performance-test abilities than it does with verbal or conceptual abilities. Children's drawings of the human figure appear to be valuable as measures of cognitive, conceptual factors.[13] There also is evidence that the Draw-A-Person Test is relatively free of cultural bias.[14]

The test required the pupils to draw a man and to draw a woman. The drawings were then scored using standardized procedures. The resulting total score was used as a measure of conceptual maturity.

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[11] Cyril J. Hoyt and Walter W. Cook, "The Prediction Validity of the Minnesota Teacher Attitude Inventory Based on Pupil Attitudes Toward School," Journal of Teacher Education, X (March, 1959), pp. 42-44.

[12] Dale B. Harris, Children's Drawings as Measures of Intellectual Maturity (New York: Harcourt, Brace and World, 1963), p. 225.

[13] Ibid., p. 225.

[14] Ibid., p. 133.

An instrument for measuring conceptual maturity was considered important in this study because conceptual maturity, while related to general intelligence, can be measured in terms of growth. In addition, an instrument which was relatively culture-free was wanted. The Draw-A-Person Test met the criteria established.

Data Collected by Classroom Observation

The specific measures of classroom behavior were the Observation Schedule and Record (Form 2e), a standardized observation record, and the Russell Sage Social Relations Test, a test of pupil skill in cooperative planning and work.

Observation Schedule and Record (OSCAR).--The OSCAR was developed to provide a technique for measuring classroom behavior.[15] An observor records specific classroom behavior and the scoring is a clerical operation that optimizes the objective nature of the measure.

The administration of the OSCAR requires thirty minutes. Fifteen minutes of each administration are spent observing specific types of pupil behavior. For this study, the observor recorded the specific behavior and the name of the pupil exhibiting the behavior.

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[15] Donald M. Medley and Harold E.Mitzel, "A Technique for Measuring Classroom Behavior," Journal of Educational Psychology, XLXX, No. 2 (April, 1958), p. 86.

Medley and Mitzell, in a study that derived fourteen scales and performaned a factor of analysis, found a reliability above .60 for the scales and above .77 for the three factor scores derived.[16] It was concluded that:

> (1) relatively untrained observors using an instrument like OSCAR can develop reliable information about differences in classroom teachers, (2) the OSCAR is sensitive to only three of many dimensions that exist, and (3) observations made with instruments like the OSCAR can contribute to the solution of many important problems having to do with the nature of effective teaching.[17]

Bowers and Soar[18] used the OSCAR in a study comparing teachers who had laboratory experiences in human relations with teachers who did not have them. They found interesting relationships between classroom behavior and certain personality and attitude test scores.[19]

Bowers, Davis, and Bowers used the Observation Schedule and Record in a study concerned with the relationship between teachers' perception of self and others and classroom behavior. Using the Index of Adjustment and Values (IAV) to inventory teacher attitudes, they found at least one IAV scale related significantly with each observed behavior except for "supportive teacher behavior."[20] They concluded that "the effect of the self concept of teachers upon classroom behavior of teachers and their pupils is substantiated."

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[16] Medley and Mitzel, *op. cit.*, p. 90.

[17] *Ibid.*, p. 92.

[18] Norman D. Bowers and Robert S. Soar, *Studies of Human Relations in the Teaching-Learning Process. V. Final Report: Evaluation of Laboratory Human Relations Training for Classroom Teachers* (Chapel Hill: University of North Carolina, 1961), p. 37. (Mimeog.)

[19] *Ibid.*, pp. 138-139.

Medley and Mitzel[21] in the Handbook of Research on Teaching summarized the research related to measuring classroom behavior by observations and reviewed the research related to the OSCAR.

The data available about the OSCAR indicated a reliable instrument for recording classroom behavior of individual pupils during actual teaching episodes. For this study, the pupil activities were scored as "contributing" or "non-contributing."[22] "Contributing" items were the usual activities which contribute to the classroom environment: i.e., answering the teacher's questions, reciting, reading, passing papers, etc. "Non-contributing" items were the items included on Medley and Mitzel's Scale 9, "Disorderly Pupil Beaavior."[23] This scale included such activities as ignoring the teacher's questions, showing hostility, fighting, and whispering. The "contributing" and "non-contributing" items are listed in Table II.

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[20] Norman D. Bowers, O. L. Davis, Jr., and Mary Bowers, "The Effectiveness of the Index of Adjustment and Values in Prediction of Classroom Behavior," National Council on Measurement in Education, 19th Yearbook, XIX (1962), pp. 112-120.

[21] Donald M. Medley and Harold E. Mitzel, "Measuring Classroom Behavior by Systematic Observation," Handbook of Research on Teaching (N. L. Gage, ed., Chicago: Rand McNally and Company, 1963), pp. 247-326.

[22] A frequency distribution of each item of the "contributing" and "non-contributing" scales are in Table 16, Appendix B.

[23] Medley and Mitzel, op. cit., p. 325.

Russell Sage Social Relations Test (RSSR).-- This measure was developed to evaluate the nature and quality of elementary school children's skill in cooperative group planning and group action.[24] The test material consists of a construction problem involving thirty-six interlocking blocks of two shapes and three colors. The pupils first plan how they are going to construct the problem and then actually carry out the construction.

Administration of the problem requires an examiner and observor. During the testing session, the teacher may remain in the classroom but is inactive. The examiner's role is carefully defined. He explains the test and its rules in a standardized way, attempts to create and maintain an atmosphere in which optimum group planning is possible, and refrains from providing any ideas or ways of solving the problem of evaluating the ideas of the class. During the work period the examiner withdraws and refuses to give assistance or information.

Meanwhile the observor sits apart from the group and during the planning stage records the suggestions made by each child and the child's name. During the operation stage the recorder records the behavior of the children, identifying what is happening and by whom. This portion of the recording is done through use of a

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[24] Dora E. Damrin, "The Russell Sage Social Relations Test: A Technique for Measuring Group Problem Solving Skills in Elementary School Children," Journal of Experimental Education, XXXVIII, No. 1 (January, 1959), pp. 72-73.

TABLE II

SCALES FROM THE OBSERVATION SCHEDULE AND RECORD

"Contributing" Scale

Teacher questions, pupil answers.
Teacher answers pupil's question.
Pupil reads, studies at seat.
Pupil writes, manipulates an object at seat.
Pupil points, cuts, draws, etc.
Pupil works at board.
Pupil decorates room or board.
Pupil talks to group.
Pupil recites.
Pupil reports, gives prepared talk.
Pupil reads aloud.
Pupil demonstrates or illustrates.
Pupil gives skit or play.
Pupil sings or plays instrument.
Pupil plays game.
Pupil interprets.
Pupil leads class.
Pupil passes papers, books, milk.
Pupil shows affection for teacher.

"Non-Contributing" Scale[a]

Pupil ignores teacher's question.
Pupil scuffles or fights.
Pupil whispers.
Pupil laughs.
Pupil shows hostility towards teacher.
Pupil shows hostility towards pupil.

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[a] These are the same items as comprise Medley and Mitzel's Scale 9.

tape recorder so that it is possible to record most of what is happening in the room. A fifteen minute time limit for the construction phase of the problem is specified. No time limit was specified for the planning phase.

For this study, the pupil's actions during the operation stage were scored as "contributing" or "non-contributing." "Contributing" activities were those activities which helped the group construct the problem. "Non-contributing" activities were those which distracted from the successful completion of the problem.

Bowers and Soar used the RSSR in a study of laboratory training in human relations. Significant difference in pupil behavior on the RSSR existed between those experimental and control teachers who had specified personal characteristics as inventoried by the *Minnesota Multiphasic Personality Inventory*, with difference favoring the experimental group.[25]

The RSSR was utilized in this study since it is a procedure with known reliability and is one of the few procedures that directly assesses the group behavior of pupils in a classroom situation.

V. THE SAMPLE

The sample consisted of 707 pupils and their thirty classroom teachers in the Evanston Public Schools, Evanston, Illinois. The teachers in each school group were selected as to comprise comparable groups and their pupils were then used as the sample.

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[25] Bowers and Soar, *op. cit.*, p. 140.

Selection of Teachers

Ten classroom teachers at Central School in Evanston, Illinois, a nongraded school encompassing the chronological ages found in a typical K-6 school, comprised the experimental group.

The teachers in the control groups were selected after all the teachers in the district teaching in K-6 graded schools were stratified on the basis of age level taught, sex, training,[26] and years of experience. Using a table of random numbers,[27] the control sample of teachers were chosen so that teachers sharing similar chacteristics to the experimental group were included.

Characteristics of the teachers have been given in Tables XIII, XIV, and XV in Appendix B. The experimental group and control group one had participated in a summer in-service education program that among other things involved a T-Group experience.[28] As might be expected, the background of the three groups were identical in terms of training and years of experience. Although there was a slight absolute difference between the groups with regard to the ages of the pupils taught, no statistically significant difference ($P > .05$) was found. Selected attitude and personality inventories were administered to the two groups of teachers;

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[26] The Evanston Public Schools have a five track schedule for teachers. Tracks one and two are based solely on training, the Bachelors' degree and Masters' degree respectively. Tracks three, four, and five are merit tracks, although training above the Masters' degree is considered in granting movement to these tracks. Track placement of each teacher was considered as part of the stratification by training.

[27] Walker and Lev, op cit., p. 280.

[28] Details of this portion of the project are in draft and will be published later.

no statistically significant differences (P >.05) between the groups were located.

Classification of Pupils

All of the pupils in the thirty classrooms who were present for at least one testing session were included in the sample. These pupils were identified as normal age, underage, or overage as defined in Chapter I. Table III shows the number of normal age, underage, and overage pupils in each school group. These pupils were administered the inventories and tests, and data collected from them is described in the preceding section.

TABLE III

THE NUMBER OF NORMAL AGE, UNDERAGE, AND OVERAGE PUPILS IN THE EXPERIMENTAL GROUP AND THE CONTROL GROUPS

	Experimental Group	Control Group One	Control Group Two
Normal Age	156	214	194
Underage	36	14	10
Overage	32	21	30

VI. PROCEDURES IN COLLECTING DATA

There were two distinct steps in the collection of data: (1) the collection of all test and inventory data, and (2) the collection of the classroom observation data.

Collection of Test and Inventory Data

These data were collected at the beginning and at the end of the school year by psychometrists in the Evanston Public Schools. They were experienced with the administration of the Stanford Achievement Test. For the administration of the Describe Your School and the Draw-A-Person tests, instructions were provided by the consultant for the Central School Project.

Collection of the Classroom Observation Data

The classroom behavioral data were collected by the psychometrists. Since the procedure required considerable experience to gain agreement on their use, the psychometrists, the consultant, and this investigator met together repeatedly. Directions and test manuals were read and discussed and agreements on interpretation reached. Observations were then carried out in non-participating schools until agreement among the staff members was high. In addition, after data collection was begun, the staff frequently observed together and compared findings. For the Russell Sage Social Relations Test, practice sessions were held in non-participating schools until the staff had attained a high degree of proficiency in administration and observation. After data collection began, a regular program of checking procedures were followed.

The Russell Sage Social Relations Test was administered to classes during the spring of the school year. Observers using the Observation Schedule and Record visited each classroom six times during the year.

VII. PROCEDURES USED TO ANALYSE THE DATA

Following the selection of covariates, the analysis of data involved three major steps: the analysis of the interaction of the three age groups of pupils with the three school groups; the analysis of differences among the three age groups; the analysis of differences between the two school groups.[29] These steps utilized multivariate analysis of variance techniques followed by univariate analyses so that specific group differences might be located.

Multivariate Analysis of Covariance.

In its simplest terms, the multivariate analysis is a simultaneous analysis of all variables.

> A basic concept useful in considering several variates together is the test space concept. If *m* measurements have been made on *N* individuals, each individual can be represented as a point in the *m*-dimensional space. Each point (individual) has a unique location depending on the combination of the *m* scores resulting from the *m* measurements.[30]

For the purposes of this project, each age group within each school group was considered as a point on the test space which represents the unique location of that group, determined by the combination of all the scores on all the measures.

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[29] The computer program used was developed by R. Darrell Bock and programmed for the IBM 7094 computer by Jeremy D. Finn at the University of Chicago. See the following articles by Bock. R. Darrell Bock, "A Computer Program for Univariate and Multivariate Analysis of Variance" in *Proceedings of the IBM Scienctific Computing Symposium on Statistics*, October 21-33, 1963, White Plains New York: IBM Data Processing Division, pp. 69-111;

________, "Contributions of Multivariate Experimental Design to Educational Research," in *Handbook of Multivariate Experimental Psychology* (ed. Raymond B. Cattell; Chicago: Rand McNally, 1963), 320-341; and

________, "Programming Univariate and Multivariate Analysis of Variance," *Technometrics*, 5 (February, 1963), pp. 95-117.

[30] William W. Cooley and Paul R. Lohnes, *Multivariate Procedures for the Behavioral Sciences* (New York: John Wiley and Sons, Inc., 1963), p. 1.

According to Kendall, "We may thus define multivariate analysis as the branch of statistical analysis which is concerned with the relationships of sets of dependent variates."[31]

As Jones has stated, there are "unique advantages of using a multivariate design as contrasted to alternative procedures either of repeated univariate experimentation or of arbitrary consolidation of the several dependent variates into a single measure."[32]

The advantage for this study was that the multivariate analysis permitted analyzing all the important factors simultaneously in a manner which considered the relationships among the factors.

Univariate Analysis of Covariance

The analysis of covariance is a method of testing hypotheses concerning means of several populations when initial differences between the populations are controlled.[33] The analysis uses regression analyses in which the means of the dependent variables are adjusted to account for differences in the independent variables.

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[31] M. G. Kendall, A Course in Multivariate Analysis (London: Charles Griffin and Co., Ltd., 1961), p. 6.

[32] Lyle V. Jones, "Some Illustrations of Psychological Experiments Designed for Multivariate Statistical Analysis" (University of North Carolina: Psychometric Laboratory, 28; December, 1960 , p p. 1.

[33] Helen M. Walker and Joseph Lev, Statistical Inference (New York: Holt, Rinehart and Winston, 1963), p. 387.

In the analysis of covariance we have several observations for each subject. Certain of these can be designated as supplementary measures which are not themselves of experimental interest. The other measures are those obtained on the dependent variables of interest. It is the significance of the differences between the means of the dependent variables for the various groups that is of interest.[34]

Selection of Covariates

Applications of these procedures to this study required that preliminary analyses be completed. The data collected at the beginning of the school year were conceptualized as independent variables. These were measures of achievement, attitudes, and conceptual maturity. The data collected during and at the end of the school year were the dependent variables. These data included measures of achievement, performance during a group situation, classroom behavior, attitudes, and conceptual maturity. The coefficients of correlation among the independent variables, the dependent variables, and the independent and dependent variables are given in Tables XVIII, XIX, XX, XXI, XXII, and XXIII in Appendix B. Significant correlations ($P<.05$) were found among the independent variables, among the dependent variables, and for the correlations of independent and dependent variables. On the basis of these data, decision was made to utilize the independent variables as covariates.

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[34] Allen H. Edwards, Experimental Design in Psychological Research (New York: Holt, Rinehart and Winston, 1964), p. 281.

The significance of difference ($P < .05$) among the various groups on the initial data indicated initial differences among the groups. The statistical differences are reported in Tables XXIV, and XXV in Appendix B.

VIII. SUMMARY

The purpose of the study was to assess the relationship of the form of school organization to pupils' classroom behaviors. Data related to pupils' achievement, performance during a group situation, classroom behavior, attitudes, and conceptual maturity were collected during one school year from 707 pupils enrolled in thirty classrooms. Multivariate and univariate analyses of covariance procedures were used to analyse the data.

CHAPTER IV

RESULTS AND INTERPRETATION

As indicated in Chapter III, several analyses of the data were performed. The analyses utilized three independent and eight dependent variables. The three independent variables, used as covariates, were achievement, attitudes, and conceptual maturity. The eight dependent variables were achievement, three scales derived from performance on the group problem-solving task, two scales of pupil classroom behavior derived from direct observation, attitudes toward school, and conceptual maturity. The data related to the independent variables were collected at the beginning of the school year; the data for the dependent variables were collected during and at the end of the school year.

Two steps were taken in performing the various analyses. First, multivariate analyses of covariance were calculated to determine if there were any significant differences. Second, univariate analyses of covariance were calculated to determine areas of differences for each variable.

The results have been organized into two parts: the results obtained from the study of three age groups in the three school groups and the results obtained from the three age groups within the nongraded school.

I. THE RESULTS OF THE STUDY OF THREE AGE GROUPS WITHIN THREE SCHOOL GROUPS

These results have been organized into three main categories:

interaction of age groups with school groups, analysis of differences among the age groups, and analyses of differences among the school groups.

Interaction of School Groups and Age Groups

Multivariate Analyses of Interaction.-- The multivariate analysis of covariance was completed as previously indicated; analysis of all variables, adjusted for the effects of the covariates, was completed simultaneously.

As shown in Table IV, significant interaction ($P < .01$) of the school groups with the age groups existed when all dependent variables were considered in the multivariate analysis.

TABLE IV

RESULTS OF THE MULTIVARIATE ANALYSIS OF COVARIANCE OF EIGHT DEPENDENT VARIABLES, ADJUSTED FOR INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDES, AND CONCEPTUAL MATURITY

Main Effects	df	F
School Groups	2	6.9756**
Age Groups	2	3.18**
Interaction	32	1.69**
Error	695	
Total	731	

*$.01 < P < .05$

**$P < .01$

Study of the data indicated that most of the interaction appeared to be contributed by the two OSCAR scales. The data were then reanalyzed without the OSCAR scales; the resulting multivariate analysis (Table V) showed no significant interaction of school groups and age groups ($P < .05$).

TABLE V

RESULTS OF THE MULTIVARIATE ANALYSIS OF COVARIANCE WITH SIX DEPENDENT VARIABLES, ADJUSTED FOR INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDES, AND CONCEPTUAL MATURITY

Main Effects	df	F
School Groups	2	6.0953**
Age Groups	2	2.9268**
Interaction	24	1.0290
Error	695	
Total		

**$P < .01$

Univariate Analysis of Interaction.-- Table VI contains the results of the univariate analyses of covariance. Significant interactions of age with school groups were found only with the OSCAR Contributing ($P < .01$) and the OSCAR Noncontributing ($.01 < P < .05$) scales.

Analysis of Differences Among the Age Groups

Multivariate Analysis of Difference.-- As shown in Table IV significant differences ($P < .01$) existed among the normal age, underage, and overage pupils in the multivariate analysis.

Univariate Analyses of Differences.-- Table VI summarizes the univariate analyses of covariance. The complete analyses of covariance data are in Table XXVI, Appendix C. Table VII has the mean scores and standard deviations for the entire sample of 707 pupils on each measure. Table VIII has the Mean scores in each measure for each age group within each school group, and Table

TABLE VI

SUMMARY OF THE UNIVARIATE ANALYSES OF COVARIANCE FOR EIGHT MEASURES, HOLDING CONSTANT INITIAL SCORES ON MEASURES OF ACHIEVEMENT, ATTITUDE, AND CONCEPTUAL MATURITY

Measure	Mean Squares[a]			
	School Group (df = 2)	Age Group (df = 2)	Interaction (df=32)	Error (df=695)
Stanford Achievement Test Composite	224.2518**	214.7518**	66.9503	42.9774
Russell Sage Social Relations Test, Planning	6.6810**	4.3727**	1.5114	.9262
Russell Sage Social Relations Test, Operations Contributing	11.8873**	6.9829*	1.2405	2.1148
Russell Sage Social Relations Test, Operations Non-Contributing	2.1582	6.2179	3.9752	3.2311
Observation Schedule and Record, Contributing	11.6839*	13.4039**	12.7729**	2.7082
Observation Schedule and Record, Non-Contributing	55.4110**	1.8100	9.0703*	2.8454
Describe Your School	635.5254**	24.6453	16.1967	56.4943
Draw-A-Person	2809.8984**	2941.3379**	351.6465	490.0843

[a] All F ratios have been summarized in Appendix D, Table XXV.

* $.01 < P < .05$

** $P < .01$

IX gives the mean scores on each measure for the three age groups. Significant differences were found for the *Stanford Achievement Test*, *RSSR-Planning*, the *RSSR-Operations-Contributing*, and the *Draw-A-Person*; chance differences were found for the *RSSR-Operations-Non-Contributing*, *OSCAR-Contributing*, *OSCAR-Non-Contributing* and the *Describe Your School*.

Stanford Achievement Test.-- Significant differences ($P < .01$) were found among the three age groups on the *Stanford Achievement Test* (Table VI). The underage pupils (Table IX) had the highest scores and the overage pupils had the lowest. The underage pupils constitute a group that have been accelerated. This finding is to be expected and should be related to the findings concerning the *Draw-A-Person* test.

Russell Sage Social Relations Test, Planning (RSSR-Planning).-- Significant differences ($P < .01$) were found among the age groups on the RSSR-Planning scale (Table VI). The underage pupils made significantly more suggestions during the RSSR-Planning phase than did either the normal age or overage pupils (Table IX).

Russell Sage Social Relations Test, Operations Contributing (RSSR-Operstions, Contributing).-- Significant differences ($.01 < P < .05$) were found among the three age groups on the RSSR-Operations, Contributing Scale. The overage pupils had the highest scores and the normal age pupils the lowest (Table IX).

Observation Schedule and Record, Contributing Scale (OSCAR, Contributing.-- Significant differences ($P < .01$) were found among the three age groups on this scale. The normal age pupils had the highest scores (Table IX).

TABLE VII

MEAN SCORES AND STANDARD DEVIATIONS FOR THE ENTIRE SAMPLE OF 707 PUPILS ON EACH MEASURE, WITH MEAN SCORES ADJUSTED FOR INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDES AND CONCEPTUAL MATURITY

	Mean	Standard Deviation
Standard Achievement Test Composite	49.9060	6.5597
Russell Sage Social Relations Test, Planning	1.6051	.0624
Russell Sage Social Relations Test, Operations Contributing	1.8769	1.4542
Russell Sage Social Relations Test, Operations Non-Contributing	2.1213	1.7975
Observation Schedule and Record, Contributing	2.2392	1.6457
Observation Schedule and Record, Non-Contributing	1.5493	1.6868
Describe Your School	37.5607	7.5163
Draw-A-Person	704.7536	22.1378

TABLE VIII

MEAN SCORES ON EACH MEASURE FOR AGE GROUPS WITHIN SCHOOL GROUPS ADJUSTED FOR INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDE, AND CONCEPTUAL MATURITY

	Means		
Measure	Experimental Group One (N=224)	Experimental Group Two (N=248)	Control Group (N=
NORMAL AGE			
Stanford Achievement Test Composite	48.4453	50.8648	50.3845
Russell Sage Social Relations Test, Planning	1.6963	1.4117	1.7036
Russell Sage Social Relations Test, Operations Contributing	1.7603	1.6292	2.0385
Russell Sage Social Relations Test, Operations Non-Contributing	2.1806	2.1391	2.0918
Observation Schedule and Record, Contributing	1.9335	2.5225	2.4593
Observation Schedule and Record, Non-Contributing	2.0555	1.3207	1.2947
Describe Your School	35.5056	38.8123	38.1783
Draw-A-Person	208.3378	201.3650	204.1921
UNDERAGE			
Stanford Achievement Test Composite	51.7447	53.3730	47.6544
Russell Sage Social Relations Test, Planning	1.9960	2.1238	1.5304
Russell Sage Social Relations Test, Operations Contributing	2.4674	1.7713	2.0609
Russell Sage Social Relations Test, Operations Non-Contributing	2.0912	.9451	1.4405
Observation Schedule and Record, Contributing	1.5553	2.1390	2.6529
Observation Schedule and Record, Non-contributing	2.6295	------	1.0479
Describe Your School	35.6621	39.9465	36.3181
Draw-A-Person	214.5754	209.9114	218.0029

TABLE VIII (Continued)

Measure	Means Experimental Group One (N=224)	 Experimental Group Two (N=248)	 Control Group (N=
	OVERAGE		
Stanford Achievement Test Composite	47.2574	44.0838	47.8914
Russell Sage Social Relations Test, Planning	1.6592	1.0011	1.5696
Russell Sage Social Relations Test, Operations Contributing	2.1750	1.6997	2.3605
Russell Sage Social Relations Test, Operations Non-Contributing	2.7443	2.0410	2.0781
Observation Schedule and Record, Contributing	2.5164	1.4552	1.3670
Observation Schedule and Record, Non-Contributing	2.2610	.9546	1.4596
Describe Your School	35.4827	39.6352	37.9315
Draw-A-Person	206.2470	201.5865	195.9314

TABLE IX

MEAN SCORES ON EACH MEASURE FOR THE NORMAL AGE, UNDERAGE, AND OVERAGE GROUPS ADJUSTED FOR INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDE, AND CONCEPTUAL MATURITY

	MEANS		
	Normal Age Group (N=370)	Underage Group (N=50)	Overage Group (N=53)
Stanford Achievement Test Composite	50.0304	51.4437	47.9486
Russell Sage Social Relations Test, Planning	1.5911	1.9367	1.4484
Russell Sage Social Relations Test, Operations, Contributing	1.795	2.0387	2.1217
Russell Sage Social Relations Test, Operations Non-Contributing	2.1343	1.7153	2.3255
Observation Schedule and Record, Contributing	2.3378	1.8744	1.8325
Observation Schedule and Record, Non-Contributing	1.5150	1.7455	1.6408
Describe Your School	37.6831	36.7713	37.3285
Draw-A-Person	204.2660	214.0589	201.3392

Draw-A-Person.-- Significant differences ($P < .01$) were found among the age groups on the Draw-A-Person (Table VI). The underage pupils had the highest scores and the overage pupils the lowest scores (Table XI). These findings are consistent with the findings related to achievement and are probably what should be expected; i.e., younger pupils, many of whom had been accelerated had the highest scores of tests of achievement and conceptual maturity while older pupils, many of whom had been retained, had the lowest scores.

Analysis of Difference Between the School Groups.

Multivariate Analysis.-- Table IV shows the multivariate differences between the two school groups. The significant F ratio ($P < .01$) indicated that there were differences between the nongraded school and the graded school.

Univariate Analysis.-- The means for each measure for the two school groups are given in Table X. Significant differences were found for all measures except for the RSSR-Operations-Non-Contributing Scale.

Stanford Achievement Test.-- Significant differences ($P < .01$) between the school groups were found (Table VI).

The pupils in the experimental group had scores on the achievement test that were lower than the pupils scores in the control group when initial differences were adjusted for initial differences between the groups (Table XI).

It might be speculated that what the teachers in the experimental group teach is not measured by the Stanford Achievement

TABLE X

MEAN SCORES ON EACH MEASURE FOR THE EXPERIMENTAL GROUP AND THE CONTROL GROUPS, ADJUSTED FOR INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDE, AND CONCEPTUAL MATURITY

	Experimental Group (N=224)	Control Group One (N=249)	Control Group Two (N=
Stanford Achievement Test Composite	48.2036	50.8276	49.9483
Russell Sage Social Relations Test, Planning	1.7353	1.4165	1.6767
Russell Sage Social Relations Test, Operations Contributing	1.9358	1.6002	2.0508
Russell Sage Social Relations Test, Operations, Non-Contributing	2.2385	2.0637	2.0621
Observation Schedule and Record, Contributing	1.9487	2.4110	2.3275
Observation Schedule and Record, Non-Contributing	2.1600	1.2140	1.3053
Describe Your School	35.3970	38.9455	38.0335
Draw-A-Person	208.7664	201.8643	203.7132

Test. As indicated in the review of this test by Stake and Hastings, school personnel who have supported innovations in curriculum are likely to have reservations about the item content and emphasis on grade equivalent scores.[1]

Russell Sage Social Relations Test, Planning (RSSR-Planning.-- Significant differences between the school groups were found ($P<.01$) on the RSSR-Planning (Table VI). The experimental group had the highest scores on this scale (Table X).

Russell Sage Social Relations Test, Operations Contributing (RSSR-Operations, Contributing).-- Significant differences ($P<.01$) were found between the school groups with reference to the RSSR-Operations, Contributing data (Table VI). Control group two had significantly higher scores on this measure (Table XXX) as compared with the other groups.

Observation Schedule and Record-Contributing (OSCAR-Contributing).-- Significant differences existed between the school groups on the OSCAR-Contributing scale ($.01<P<.05$) (Table VI). The pupils in the experimental group made fewer contributing responses during the usual teaching episodes than did pupils in the control groups (Table X).

Observation Schedule and Record, Non-Contributing (OSCAR-Non-Contributing).-- Significant differences ($P<.01$) were found between the school groups for OSCAR-Non-Contributing (Table VI). Pupils in the experimental group engaged in significantly more non-contributing activities during usual teaching episodes than did the pupils in the control group (Table X).

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[1] Stake and Hastings, *op. cit.*, p. 184.

It might be speculated that the two OSCAR scales are also oriented toward more traditional teaching styles. The contributing scale includes such items as "teacher questions, pupil answers"; "pupil reads, studies at seat"; and "pupil reads aloud" while the non-contributing scale includes such items as "pupil whispers" and "pupil laughs." Perhaps the teachers in an experimental program relied less on the usual classroom activities and were more accepting of so-called "disorderly pupil behavior."

Describe Your School.-- Significant differences ($P < .01$) were found between the school groups on the measure of attitudes toward school (Table VI). The pupils in the experimental group scored significantly lower on the attitude inventory than did the control group pupils (Table XI).

It might be that an experimental program which encouraged more group activities and more freedom in the classroom also encouraged a truer expression of their real feelings on a measure of attitudes toward school, particularly near the end of the school year.

Draw-A-Person.-- Significant differences ($P < .01$) between the school groups in conceptual maturity were found (Table VI). The pupils in the experimental group received significantly higher scores than did the pupils in the control group. The pupils in the nongraded school made more growth in conceptual maturity than did pupils in the graded schools (Table X).

It might seem that these findings are inconsistent with the findings related to the achievement data when it is considered that one of the co-authors of the *Draw-A-Person* test has said that "educational influences are significant in shaping and modifying the basic schemata that children adopt when they draw the human figure."[2] However, perhaps the test is influenced by only general education and not by form of school organization.

II. RESULTS OF THE STUDY OF THREE AGE GROUPS ONLY

Multivariate analysis of differences.-- As shown in Table XI, significant differences ($.01 < P < .05$) existed among the normal age, underage and overage pupils in the multivariate analysis.

Univariate analysis of differences.-- Table XII contains the analyses of covariance data. Table XIII has the mean scores and standard deviations for the entire sample of 224 pupils on each measure. Table XIV has the scores on each measure for each age group.

Significant differences were found with the *Stanford Achievement Test* Composite and the *Russell Sale Social Relations Test*, Planning Scale; *Russell Sage Social Relations Test*, Operations Non-Contributing Scale; *Observation Schedule and Record*, Non-Contributing Scale; *Observation Schedule and Record*, Contributing Scale; *Describe Your School*; and *Draw-A-Person*.

Stanford Achievement Test.-- Significant differences ($.01 < P < .05$) were found among the three age groups on the *Stanford*

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[2] Harris, *op. cit.*, p. 228

Achievement Test (Table XII). The underaged pupils (Table XIV) had the highest scores and the overaged pupils the lowest scores.

Russell Sage Social Relations Test, Operations Contributing Scale.-- Significant differences ($.01<P<.05$) were found among the three age groups on this scale. Underaged pupils had the highest scores and the normal age pupils the lowest (Table XIV).

TABLE XI

RESULTS OF THE MULTIVARIATE ANALYSIS OF COVARIANCE OF EIGHT DEPENDENT VARIABLES, ADJUSTED FOR INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDES, AND CONCEPTUAL MATURITY

Main Effects	df	F
Age Groups	2	1.0757*
Error	218	
Total	220	

*$.01<P<.05$

III. VALIDATION OF THE HYPOTHESIS

The following null hypothesis was tested in this study:

> There were no significant differences among the attitudes, academic achievement, conceptual maturity, and performance in a group situation and classroom behavior of normal age, underage, and overage pupils in non-graded classes and normal age, underage, and overage pupils in traditional graded classes.

On the basis of the data presented, this null hypothesis was rejected when tested as a multivariate model. Other individual statistical hypotheses relating to univariate analyses are listed

TABLE XII

SUMMARY OF THE UNIVARIATE ANALYSES OF COVARIANCE FOR EIGHT MEASURES, HOLDING CONSTANT INITIAL SCORES ON MEASURES OF ACHIEVEMENT, ATTITUDE, AND CONCEPTUAL MATURITY

Measure	Mean Squares[a]		
	Among Groups (df=2)	Error (df=218)	F
Stanford Achievement Test Composite	169.4119	46.3534	4.1982*
Russell Sage Social Relations Test, Planning	2.2460	1.3951	1.6101
Russell Sage Social Relations Test, Operations Contributing	7.1054	2.3155	3.0686*
Russell Sage Social Relations Test, Operations Non-Contributing	4.5617	5.1609	.8839
Observation Schedule and Record Contributing	8.0255	3.0937	2.5941
Observation Schedule and Record, Non-Contributing	5.7743	7.7250	.7475
Describe Your School	9.3063	77.0392	.1208
Draw-A-Person	929.0728	577.9253	1.6076

[a] All F ratios have been summarized in Appendix D, Table XXV

*.01 $< P <$ .05

TABLE XIII

MEAN SCORES AND STANDARD DEVIATIONS FOR THE ENTIRE SAMPLE OF 224 PUPILS ON EACH MEASURE, WITH MEAN SCORES ADJUSTED FOR INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDES AND CONCEPTUAL MATURITY

	Mean	Standard Deviation
Standard Achievement Test Composite	45.2209	9.0158
Russell Sage Social Relations Test, Planning	4.4265	1.1780
Russell Sage Social Relations Test, Operations Contributing	2.0117	1.5335
Russell Sage Social Relations Test, Operations Non-Contributing	2.2388	2.2665
Observation Schedule and Record, Contributing	1.9584	1.7630
Observation Schedule and Record, Non-Contributing	2.2089	2.8894
Describe Your School	34.3558	10.3060
Draw-A-Person	199.0639	30.3266

TABLE XIV

MEAN SCORES ON EACH MEASURE FOR THE NORMAL AGE, UNDERAGE, AND OVERAGE GROUPS ADJUSTED FOR INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDE, AND CONCEPTUAL MATURITY

	MEANS		
	Normal Age Group (N=156)	Underage Group (N=36)	Overage Group (N=32)
Stanford Achievement Test Composite	44.8708	48.1251	43.6606
Russell Sage Social Relations Test, Planning	1.6913	2.0760	1.5788
Russell Sage Social Relations Test, Operations Contributing	1.8457	2.5246	2.1868
Russell Sage Social Relations Test, Operations Non-Contributing	2.1584	2.1211	2.7636
Observation Schedule and Record, Contributing	1.9340	1.5165	2.5750
Observation Schedule and Record, Non-Contributing	2.0623	2.6554	2.4214
Describe Your School	34.4044	33.7163	34.8384
Draw-A-Person	198.3712	205.7214	194.9506

and results sumarized in tables XXVII and XXVIII in Appendix D.

IV. SUMMARY

The results of this study of 707 pupils revealed multivariate differences among the age groups, the school groups and interaction of the age groups with the school groups. Significant univariate differences among the age groups were found in achievement, group planning, group operation (Contributing Scale), and conceptual maturity. Significant univariate differences between the school groups were found in achievement, group planning, group operations (contributing scale), classroom performance, attitudes, and conceptual maturity. Significant univariate interactions were found only on classroom performance. Significant differences on some measures indicated that the pupils in the experimental groups had higher scores than the pupils in the control groups. On other measures, the directionality of differences was reversed. This same inconsistency was found for the age groups.

The results of the study concerned only with the normal age, underage, and overage pupils in the non-graded school revealed multivariate differences among the age groups. Significant univariate differences among the age groups were found only on achievement and in group operation (contributing scale). In both cases underage pupils had significantly higher scores than the normal age and the overage pupils.

These results led to the rejection of the general null hypothesis formulated by the study.

CHAPTER V

SUMMARY, CONCLUSIONS, AND SUGGESTED RESEARCH

This study sought to determine the effect of the form of school organization on pupil attitudes, achievement, conceptual maturity, and classroom behavior. Ten teachers in each of three groups in Evanston, Illinois, School District #65, were selected and 707 pupils enrolled in their classes comprised the sample. The experimental group was placed in a nongraded form of organization. The control groups, selected by a random process, represented the traditional (graded) form of organization. The pupils in all groups were subdivided into three age groups: normal age, underage, and overage.

Data were collected from the pupils in the fall, winter, and spring of one school year. The specific measures included the Describe Your School, Stanford Achievement Tests, the Draw-A-Person, the Russell Sage Social Relations Test, and two scales derived from the Observation Schedule and Record (2e). The scores obtained in the fall on the Describe Your School, Stanford Achievement Test, and the Draw-A-Person were used as covariates; data collected subsequently were the dependent variables.

For the study of 707 pupils in the three school groups, multivariate analyses of covariance were completed to determine the interaction of the age groups and school groups, the difference among the age groups, and the differences among the school groups.

Significant differences ($P < .01$) were found for the interaction among the age groups, and among the school groups. The data indicated that the two classroom observation scales were the only measures to contribute to the interaction. When a multivariate analysis was performed that eliminated these two measures, significant differences were obtained only for the age groups and school groups ($P < .01$).

Univariate analyses performed to indicate directionality of the differences among the age groups revealed that the underage pupils had the highest scores and the overage pupils the lowest scores on the measures of achievement ($P < .01$), group planning ($P < .01$), and conceptual maturity ($P < .01$). For the scale of group operations-contributing, the overage pupils were the highest and the normal age the lowest ($.01 < P < .05$). For the observation, contributing, the normal age pupils scored the highest ($P < .01$). For all other measures, no differences were found that were statistically significant.

The univariate analyses utilizing measures on the school groups showed higher scores for the experimental group on measures of conceptual maturity ($P < .01$), group planning ($P < .01$), and observations-non-contributing ($P < .01$). Control group one had higher scores ($.01 < P < .05$) on measures of achievement ($P < .01$), attitudes ($P < .01$), and observations-contributing ($.01 < P < .05$). Control group two had the highest scores on the operations, contributing ($P < .01$). There were no differences among the groups on the measure of group operations-non-contributing that were statistically significant.

For the study of 224 pupils in a nongraded school, a multivariate analysis of covariance was completed to determine differences among the age groups.

Significant differences ($.01 < P < .05$) were found among the age groups.

Univariate analyses performed to indicate directionality of the differences among the age groups revealed that the underage pupils had the highest scores and the overage the lowest scores in the area of achievement and group operations, contributing scale ($.01 < P < .05$).

I. CONCLUSIONS AND DISCUSSION

A number of conclusions seem to be suggested by the data.

1. The nongraded form of organization appeared to encourage pupil development in conceptual maturity and participation in group activities. These findings would seem to provide considerable support for the idea that the nongraded school does indeed contribute to the development of certain pupil characteristics deemed valuable in our society: namely, conceptual maturity, and participation in group activities.

2. Teachers in the nongraded school apparently were more accepting of so-called "disorderly pupil behavior" than were teachers in the graded schools. The interpretation of this finding particularly if a value judgement is made, probably is dependent upon the objectives and purposes of the school. If the school believes that pupils' interpersonal relations can be developed through an expression and understanding of feelings, whispering, laughing, and even hostility will be accepted. On the other hand,

if the school feels that the expression of hostility is unacceptable and that pupils' behaviors should be more controlled, a high score on "disorderly pupil behavior" would not be desired.

3. The graded form of organization seemed to encourage pupil development in achievement, attitudes toward school, and contributing activities during usual teaching episodes. It might be that the instruments used for measuring these characteristics were more appropriate for use in traditional schools than use with experimental programs. Also, it might be that as the nongraded school facilitated development of different kinds of pupil behaviors such as conceptual maturity, group participation, and freer expression of feelings in the classroom, the more traditional kinds of pupil behaviors, such as achievement on traditional type tests, attentiveness to the teacher, and conventional attitudes toward school were diminished.

4. The differencss among the age groups were generally as might be expected; either there were no significant differences on measures or the underage pupils scored highest and overage pupils lowest of the groups. These findings are consistent with most research studies related to grouping and promotion practices.[1] In heterogeneous classes, brighter pupils tend to have higher scores on most measures of pupil behaviors than do the other pupils

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[1] Walter R. Borg, "Ability Grouping in the Public Schools." Journal of Experimental Education, 34, No. 2 (Winter, 1935), pp. 1-97; and Walter W. Cook and Theodore Clymor, "Acceleration and Retardation" in Individualizing Instruction, 61st Yearbook, National Society for the Study of Education (ed. Holson B. Henry; Chicago: University of Chicago Press, 1962), 179-208.

in the class. A study of the classroom behaviors of the various age groups of pupils within only nongraded classrooms would provide additional information about underage and overage pupils.

5. The overage pupils in the nongraded school seemed to be much more "contributing" members of their classes than were the overage pupils in the graded schools. It should be remembered that "contributing" was defined as activities which contribute to the classroom environment. It would seem that in the situation which was presumably oriented to the needs of each individual child, the teachers were better able to keep the overage pupils involved in the tasks at hand than were the teachers in the more traditional schools.

6. It would appear that although the observations of the underage pupils classified them as engaging in more "noncontributing" activities during usual teaching episodes than the normal age and overage pupils, the achievement, conceptual maturity, and participation in group activities of these underage pupils were not lowered. It would seem that the underage pupils were probably not stimulated sufficiently by the classroom activities, but at the same time were capable of learning much of what the teachers were attempting to teach.

7. The performance of the underage pupils particularly in achievement and cooperativeness was not adversely affected by the multiage grouping plan.

8. The lack of significant differences among the age groups within the nongraded school would indicate that the multiage

grouping at least did not have an adverse effect upon any of the age groups. This would seem to lend considerable weight to the notion of multiage grouping, particularly when consideration is taken of the favorable findings of the total nongraded school as compared with the graded school.

II. SUGGESTED FURTHER RESEARCH

It has often been said that most experimental studies raise more questions than they answer. This project, which seemed deceptively clean-cut and straight-forward at its inception, seems to be no exception. On consideration of the findings of this study, the major next steps seem to be:

1. How effective would be the prediction of pupils classroom behaviors if they were assigned to a nongraded school?

2. That differences exist has been demonstrated, although in areas not universally accepted by all various groups as the most important of educational objectives.

3. The need has been suggested for the development of differences measuring instruments that will observe and give an evaluation of educational objectives in addition to the traditional means.

III. CONCLUDING STATEMENT

The demonstration of differences is a first step in developing a science of education. The identification of differences in varying areas should encourage research workers to explore further the relationship among operationally defined aspects of the school program and the most important outcome of an educational experience

--pupils' behaviors.

This study demonstrated that: (1) multivariate analyses are appropriate to curriculum problems; (2) pupil behaviors and school organization can be studied and evaluated; and (3) if the nongraded form of school organization is compared with a traditional form and coupled with multiage grouping, differences in pupil behaviors should result.

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APPENDIX A

CHARACTERISTICS OF THE TEACHERS

TABLE XV

MEANS AND STANDARD DEVIATIONS FOR THE GROUPS OF TEACHERS FOR THE *BOWERS TEACHER OPINION INVENTORY* (BTOI), *MINNESOTA TEACHER ATTITUDE INVENTORY* (MTAI), AND THE *MINNESOTA MULTIPHASIC PERSONALITY INVENTORY* (MMPI)[a]

	Experimental Group (n=10)		Control Group 1 (n=10)		Control Group 2 (n=10)	
Measure	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
BTOI	127.0	13.86	121.8	12.55	130.2	12.81
MTAI	88.6	32.14	92.3	34.48	106.1	29.21
MMPI						
L	49.0	6.45	49.7	6.07	47.3	4.19
F	9.1	5.04	47.8	3.29	49.5	3.87
K	58.3	6.31	60.8	7.91	59.8	5.01
Hs	48.7	4.57	46.7	5.76	50.0	6.39
D	47.4	7.31	44.1	8.24	48.8	5.05
Hy	53.1	3.67	56.0	6.86	56.5	6.75
Pd	50.2	5.83	57.2	8.13	55.9	9.24
Mf	47.8	12.58	47.2	13.00	42.7	12.18
Pa	52.2	7.15	53.6	8.22	53.5	11.30
Pt	45.6	3.60	47.9	8.23	49.3	8.41
Sc	49.6	4.01	51.7	8.00	50.4	3.41
Ma	55.4	9.83	58.2	6.18	55.1	6.77
Si	48.3	11.35	45.1	6.79	45.7	7.70
A	39.6	4.60	38.7	5.96	40.0	7.80
R	47.1	6.51	46.6	8.67	45.7	8.50
PV	41.3	8.49	39.2	7.87	42.5	9.47
TA	37.4	11.0	37.2	8.38	39.8	9.27
Ho	57.9	3.98	58.8	5.14	57.0	2.49
Es	61.1	5.70	62.5	8.18	59.9	3.45

[a] Analyses of variance were completed to test significance of differences among the three groups. No significant differences among the groups were found ($P > .05$; df = 2.27). All *F ratios* were found to be less than 1 ($P < 1$; df = 2.27) except for the *BTOI* ($F = 1.05$); MMPI-D ($F = 1.19$); and MMPI-Pd ($F = 2.23$).

TABLE XVI

YEARS OF EXPERIENCE AND TRAINING OF THE THIRTY TEACHERS SELECTED FOR THE EXPERIMENTAL AND CONTROL GROUPS

Level of Training*	Years of Experience			
	1 - 5	6 - 10	11 - 18	19 - 38
I	2	1		
II		1	2	1
III		2		
IV				1

[*] I = Teachers with Bachelors' Degree; II = Teachers with Masters' Degree; III and IV = Teachers with the Masters' Degree who have been judged to be meritorious in their services to the district.

TABLE XVII

FREQUENCY DISTRIBUTION OF TWENTY TEACHERS ARRANGED BY AGE OF PUPILS WHO WERE TAUGHT

Age of Pupils	Experimental Group	Control Group 1	Control Group 2
6, 7,8	5	4	6
9, 10, 11	5	6	4

APPENDIX B

MISCELLANEOUS STATISTICAL DATA

TABLE XVIII

INTERCORRELATION OF THREE MEASURES OF PUPIL BEHAVIOR, FALL, 1964, BASED ON 707 PUPILS

	Stanford Achievement Test Composite	Describe Your School	Draw -A- Person
Stanford Achievement Test Composite	1.0000		
Describe Your School	0.1192 **	1.0000	
Draw-A-Person	0.2442 **	0.0980 **	1.0000

*$.01 < P < .05$

**$P < .01$

TABLE XIX

INTERCORRELATION OF DEPENDENT VARIABLES SPRING, 1965, BASED ON 707 PUPILS

	Stanford Achievement Test Composite	Russell Sage Social Relations Test, Planning	Russell Sage Social Relations Test, Operations Contributing	Russell Sage Social Relations Test, Operations Non-Contributing
Stanford Achievement Test Composite	1.0000			
Russell Sage Social Relations Test, Planning	-0.0256	1.0000		
Russell Sage Social Relations Test, Operations Contributing	-0.0321	0.1031**	1.0000	
Russell Sage Social Relations Test, Operations Non-Contributing	-0.0074	-0.0117	-0.0508	1.0000
Observation Schedule and Record, Contributing	0.0496	-0.0072	-0.0273	0.0667
Observation Schedule and Record, Non-Contributing	0.0014	0.0342	0.0159	0.0972*
Describe Your School	0.1668**	-0.0189	-0.0196	-0.0826*
Draw-A-Person	0.3588**	-0.0280	-0.0704	-0.0416

* $.01 < P < .05$

** $P < .01$

TABLE XIX (Continued)

	Observation Schedule and Record, Contributing	Observation Schedule and Record, Non-Contributing	Describe Your School	Draw -A- Person
Stanford Achievement Test Composite				
Russell Sage Social Relations Test, Planning				
Russell Sage Social Relations Test, Operations Contributing				
Russell Sage Social Relations Test, Operations Non-Contributing				
Observation Schedule and Record, Contributing	1.0000			
Observation Schedule and Record, Non-Contributing	0.0484	1.0000		
Describe Your School	-0.0258	-0.1793**	1.0000	
Draw-A-Person	-0.0037	-0.0564	0.0730	1.0000

*$.01 < P < .05$

**$P < .01$

TABLE XX

CORRELATION COEFFICIENTS OF INDEPENDENT AND DEPENDENT VARIABLES FALL, 1964, AND SPRING, 1965, BASED ON 707 PUPILS

Dependent Variables	Independent Variables		
	Stanford Achievement Test Composite (Fall)	Describe Your School (Fall)	Draw -A- Person (Fall)
Stanford Achievement Test Composite (Spring)	0.6498**	0.1377**	0.3306**
Russell Sage Social Relations Test, Planning	-0.0080	0.0215	-0.0034
Russell Sage Social Relations Test, Operation Contributing	-0.0811*	0.0348	-0.0649
Russell Sage Social Relations Test, Operation Non-Contributing	0.0322	0.0155	-0.0311
Observation Schedule and Record, Contributing	0.0255	-0.0491	-0.0247
Observation Schedule and Record, Non-Contributing	0.0474	-0.1854**	-0.0709
Describe Your School (Spring)	0.1875**	0.4267**	0.0730
Draw-A-Person (Spring)	0.2395**	0.0730	0.6576**

*$.01 < P < .05$

**$P < .01$

TABLE XXI

INTERCORRELATION OF THREE MEASURES OF PUPIL BEHAVIOR, FALL, 1964, BASED ON 224 PUPILS

	Stanford Achievement Test Composite	Describe Your School	Draw -A- Person
Stanford Achievement Test Composite	1.0000		
Describe Your School	.0762	1.0000	
Draw-A-Person Test	.3629**	.1386*	1.0000

*$.01 < P < .05$
**$P < .01$

TABLE XXII

INTERCORRELATION OF DEPENDENT VARIABLES SPRING, 1965, BASED ON 224 PUPILS

	Stanford Achievement Test Composite	Russell Sage Social Relations Test, Planning	Russell Sage Social Relations Test, Operations Contributing	Russell Sage Social Relations Test, Operations Non-Contributing
Stanford Achievement Test Composite	1.0000			
Russell Sage Social Relations Test, Planning	- .1149	1.0000		
Russell Sage Social Relations Test, Operations Contributing	- .1226	.0615	1.0000	
Russell Sage Social Relations Test, Operations Non-Contributing	.0168	.0028	- .1921**	1.0000
Observation Schedule and Record, Contributing	- .0850	.0949	- .0448	.1100
Observation Schedule and Record, Non-Contributing	.0096	.0185	.0151	.1092
Describe Your School	.2243**	- .0700	- .0435	- .1797*
Draw-A-Person	.4120**	- .0431	- .0729	- .0545

[*] $.01 < P < .05$

[**] $P < .01$

TABLE XXII (Continued)

	Observation Schedule and Record, Contributing	Observation Schedule and Record, Non-Contributing	Describe Your School	Draw -A- Person
Stanford Achievement Test Composite				
Russell Sage Social Relations Test, Planning				
Russell Sage Social Relations Test, Operations Contributing				
Russell Sage Social Relations Test, Operations Non-Contributing				
Observation Schedule and Record, Contributing	1.0000			
Observation Schedule and Record, Non-Contributing	.1291	1.0000		
Describe Your School	- .0688	- .2176**	1.0000	
Draw-A-Person	.0096	- .0950	.2151**	1.0000

*.01< P < .05

**P <.01

TABLE XXIII

CORRELATION COEFFICIENTS OF INDEPENDENT AND DEPENDENT VARIABLES FALL, 1964, AND SPRING, 1965, BASED CN 224 PUPILS

Dependent Variables	Independent Variables		
	Stanford Achievement Test Composite (Fall)	Describe Your School (Fall)	Draw -A- Person (Fall)
Stanford Achievement Test Composite (Spring)	.6864**	.1402*	.4229**
Russell Sage Social Relations Test, Planning	- .0838	- .0353	- .0112
Russell Sage Social Relations Test, Operation Contributing	- .1288	.0998	- .0374
Russell Sage Social Relations Test, Operation Non-Contributing	.0117	- .0817	- .0466
Observation Schedule and Record, Contributing	.0349	- .1015	.0728
Observation Schedule and Record, Non-Contributing	.0566	- .2610**	- .1159
Describe Your School (Spring)	.2367**	.4943**	.1491*
Draw-A-Person (Spring)	.2456**	.1004	.6159**

$^{*}.01 < P < .05$

$^{**}P < .01$

TABLE XXIV

ANALYSES OF DIFFERENCES AMONG THE GROUPS ON INITIAL MEASURES OF ACHIEVEMENT, ATTITUDES, AND CONCEPTUAL MATURITY FOR STUDY OF 707 PUPILS

	Mean Square		
	Among Age Groups (df=2)	Among School Groups (df=2)	Error (df=702)
Stanford Achievement Test Composite	1174.8127**	2527.9692**	68.6633
Describe Your School	23.4911	215.4908**	46.9671
Draw-A-Person	6755.4050**	32584.6152**	1595.7689

**P < .01

TABLE XXV

ANALYSES OF DIFFERENCES AMONG THE GROUPS ON INITIAL MEASURES OF ACHIEVEMENT, ATTITUDES, AND CONCEPTUAL MATURITY FOR STUDY OF 224 PUPILS

	Mean Square		
	Among Groups (df=2)	Within Groups (df=221)	F
Stanford Achievement Test Composite	880.1350	87.7752	10.03**
Describe Your School	87.6755	67.0262	1.31
Draw-A-Person	4875.6815	760.9880	6.41**

$^{**}P < .01$

APPENDIX C

ANALYSES OF COVARIANCE, HOLDING CONSTANT INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDES, AND CONCEPTUAL MATURITY

TABLE XXVI

ANALYSES OF COVARIANCE, HOLDING CONSTANT INITIAL DIFFERENCES ON MEASURES OF ACHIEVEMENT, ATTITUDES, AND CONCEPTUAL MATURITY

	df	Mean Square	F
STANFORD ACHIEVEMENT TEST			
School Groups	2	224.2518	5.2179**
Age Groups	2	214.7518	4.9969**
Interaction	4	66.9503	1.5578
Error	695	42.9774	
RUSSELL SAGE SOCIAL RELATIONS TEST, Planning Scale			
School Groups	2	6.6810	7.2135**
Age Groups	2	4.3727	4.7212**
Interaction	4	1.5114	1.6319
Error	695	.9262	
RUSSELL SAGE SOCIAL RELATIONS TEST, OPERATIONS, CONTRIBUTING SCALE			
School Groups	2	11.8873	5.6210**
Age Groups	2	6.9829	3.3019*
Interaction	4	1.2405	0.5866
Error	695	2.1148	
RUSSELL SAGE SOCIAL RELATIONS TEST, OPERATIONS, NONCONTRIBUTING SCALE			
School Groups	2	2.1582	0.6680
Age Groups	2	6.2179	1.9245
Interaction	4	3.9752	1.2303
Error	695	3.2311	
OBSERVATION SCHEDULE AND RECORD, CONTRIBUTING SCALE			
School Groups	2	11.6839	4.3142*
Age Groups	2	13.4039	4.9493**
Interaction	4	12.7729	4.7163**
Error	695	2.7082	
OBSERVATION SCHEDULE AND RECORD, NONCONTRIBUTING SCALE			
School Groups	2	55.4110	19.4740**
Age Groups	2	1.8100	.6361
Interaction	4	9.0703	3.1877*
Error	695	2.8454	

TABLE XXVI (Continued)

	df	Mean Square	F
DESCRIBE YOUR SCHOOL			
School Groups	2	635.5240	11.2492 **
Age Groups	2	24.6453	.4362
Interaction	4	16.1967	0.2867
Error	695	56.4943	
DRAW-A-PERSON			
School Groups	2	2809.8984	5.7335**
Age Groups	2	2941.3379	6.0017
Interaction	4	351.6465	.7175
Error	695	490.0843	

$^{**}P < .01$

$^{*}.01 < P < .05$

APPENDIX D

SUMMARY OF DATA RELATED TO THE STATISTICAL HYPOTHESES THAT WERE TESTED

TABLE XXVII

SUMMARY OF DATA RELATED TO THE STATISTICAL HYPOTHESES THAT WERE TESTED, BASED ON 707 PUPILS

Hypothesis 1: There were no significant differences among the normal age, underage, and overage pupils for each of eight measures, holding constant initial differences on measures of achievement, attitudes, and conceptual maturity.

Measure	Significance Level	Decision
Achievement Composite	$P < .01$	Reject
Group Planning Scale	$P < .01$	Reject
Group Operation, Contributing Scale	$.01 < P < .05$	Reject
Group Operations, Noncontributing Scale	$P > .05$	Fail to Reject
Classroom Observation, Contributing Scale	$P < .01$	Reject
Classroom Observation, Noncontributing Scale	$P > .05$	Fail to Reject
Attitudes	$P > .05$	Fail to Reject
Conceptual Maturity	$P < .01$	Reject

Hypothesis 2: There were no significant differences between the experimental group and the control groups for each of eight measures, holding constant initial differences on measures of achievement, attitudes, and conceptual maturity.

Measure	Significance Level	Decision
Achievement Composite	$P < .01$	Reject
Group Planning Scale	$P < .01$	Reject
Group Operations, Contributing Scale	$P < .01$	Reject
Group Operations, Noncontributing Scale	$P > .05$	Fail to Reject
Classroom Observation, Contributing Scale	$.01 < P < .05$	Reject
Classroom Observation, Noncontributing Scale	$P < .01$	Reject
Attitudes	$P < .01$	Reject
Conceptual Maturity	$P < .01$	Reject

TABLE XXVIII

SUMMARY OF DATA RELATED TO THE STATISTICAL HYPOTHESES THAT WERE TESTED, BASED ON 224 PUPILS

Hypothesis: There were no significant differences among the normal age, underage, and overage pupils for each of eight measures, holding constant initial differences on measures of achievement, attitudes, and conceptual maturity.

Measure	Significance Level	Decision
Achievement Composite	$.01 < P < .05$	Reject
Group Planning Scale	$P > .05$	Fail to Reject
Group Operation, Contributing Scale	$.01 < P < .05$	Reject
Group Operations, Noncontributing Scale	$P > .05$	Fail to Reject
Classroom Observation, Contributing Scale	$P > .05$	Fail to Reject
Classroom Observation, Noncontributing Scale	$P > .05$	Fail to Reject
Attitudes	$P > .05$	Fail to Reject
Conceptual Maturity	$P > .05$	Fail to Reject